(12) UK Patent Application (19) GB (11) 2 325 805 (13) A

(43) Date of A Publication 02.12.1998

(21) Application No 9811170.1

(22) Date of Filing 22.05.1998

(30) Priority Data
(31) 97022204 (32) 30.05.1997 (33) KR

(51) INT CL[6]
H04N 5/50 7/20

(52) UK CL (Edition P)
H3Q QCD Q101 Q200 Q6F Q6M Q6R4

(56) Documents Cited
EP 0601553 A1 EP 0453937 A2 US 5512955 A
US 5257106 A

(58) Field of Search
UK CL (Edition P) H3Q QCD
INT CL[6] H04N 5/46 5/50 7/20

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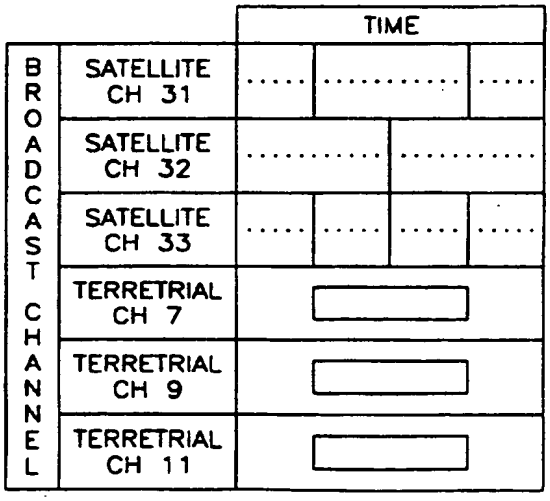
(54) Abstract Title
Selecting a channel in a composite analogue/digital TV receiver

(57) A tuning table for all received signals, such as those from satellite, terrestrial and CATV sources, is compiled in memory during a self-tuning phase. Channel information carried in the signal in each channel is detected and stored in the memory. This self-tuning operation may be repeated regularly during standby. Channel information is displayed on the screen when a new channel is to be selected, and a screen cursor may be controlled to select the desired channel. If the new selected channel is of a different analogue/digital mode to that of the channel currently tuned, then the receiver mode is altered automatically so that the user does not have to enter the mode of the new desired channel.

FIG. 4



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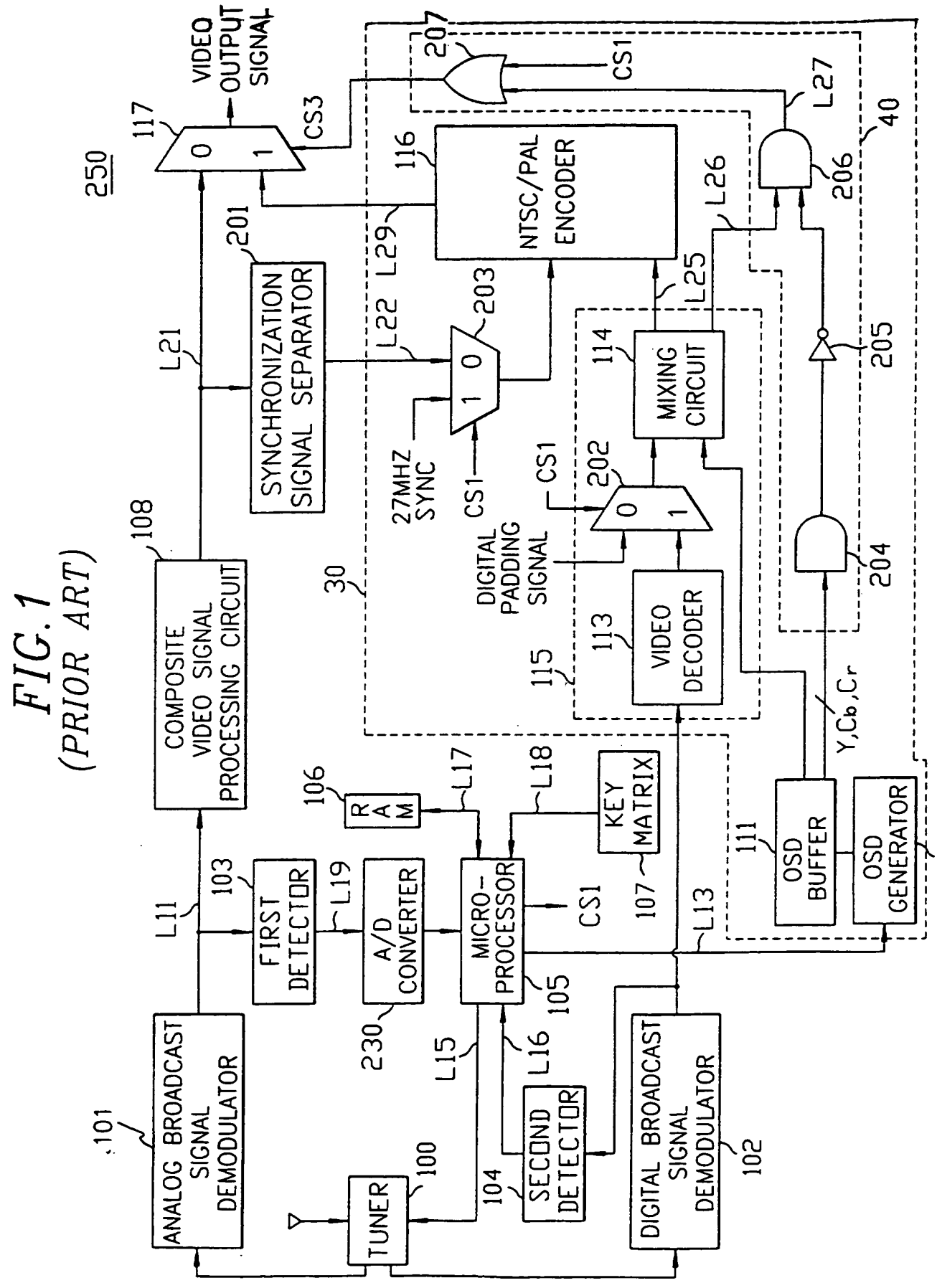


FIG. 1
(PRIOR ART)

FIG. 2A

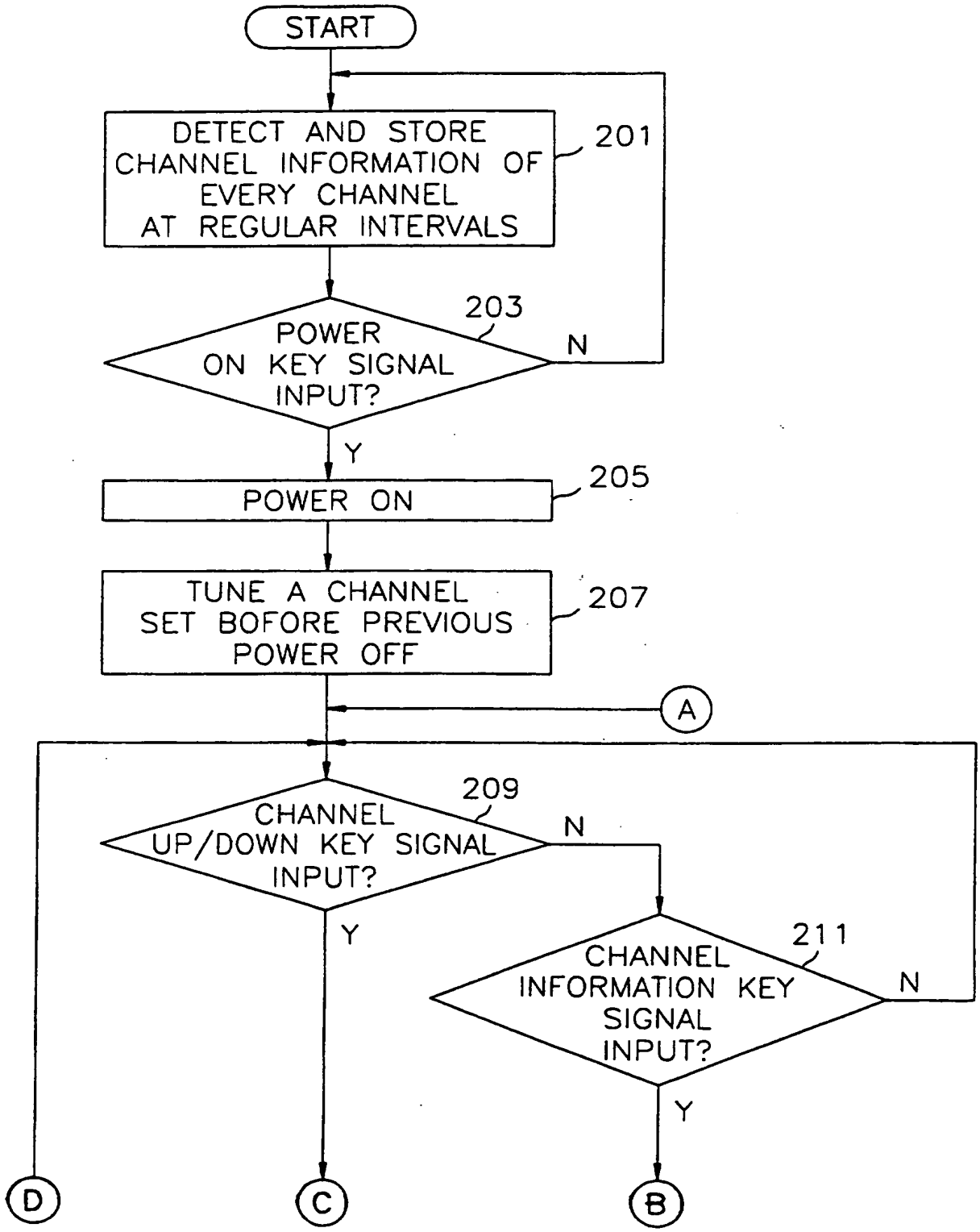


FIG.2B

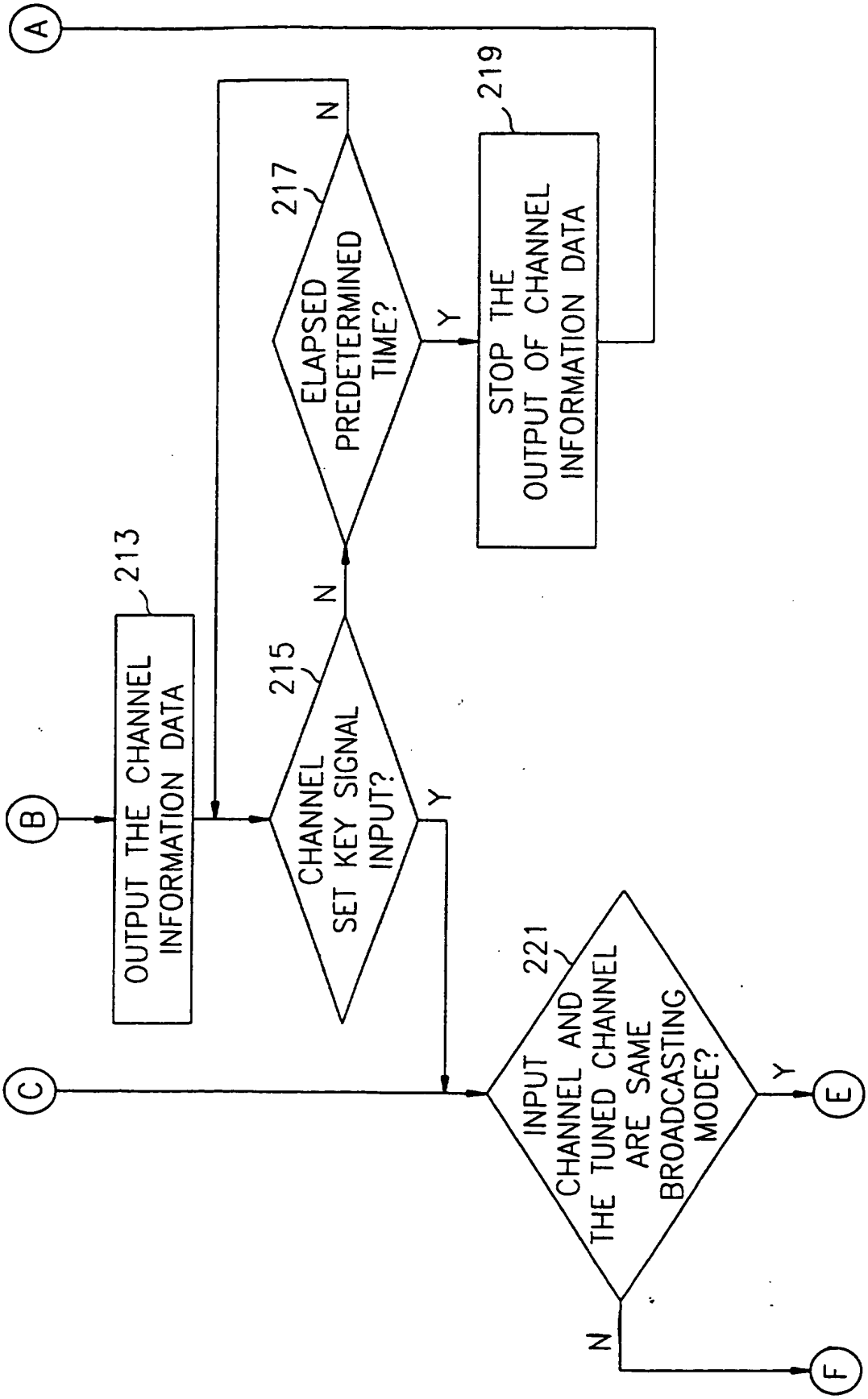


FIG. 2C

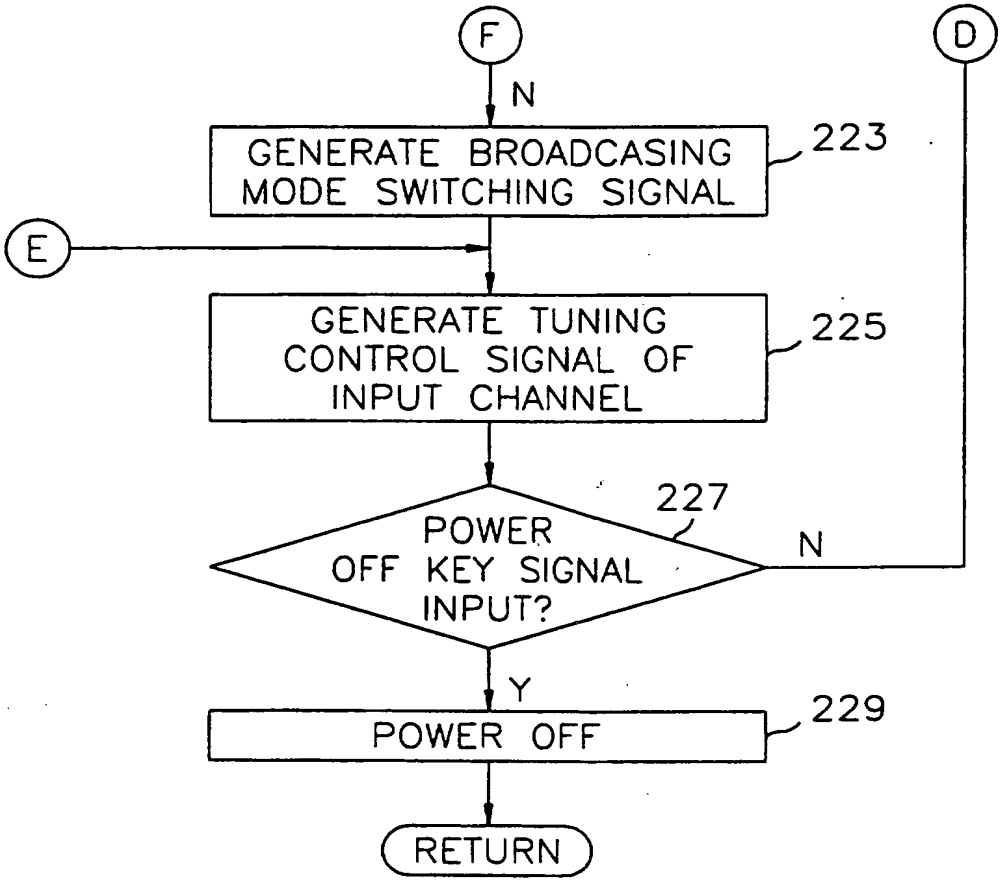


FIG. 3

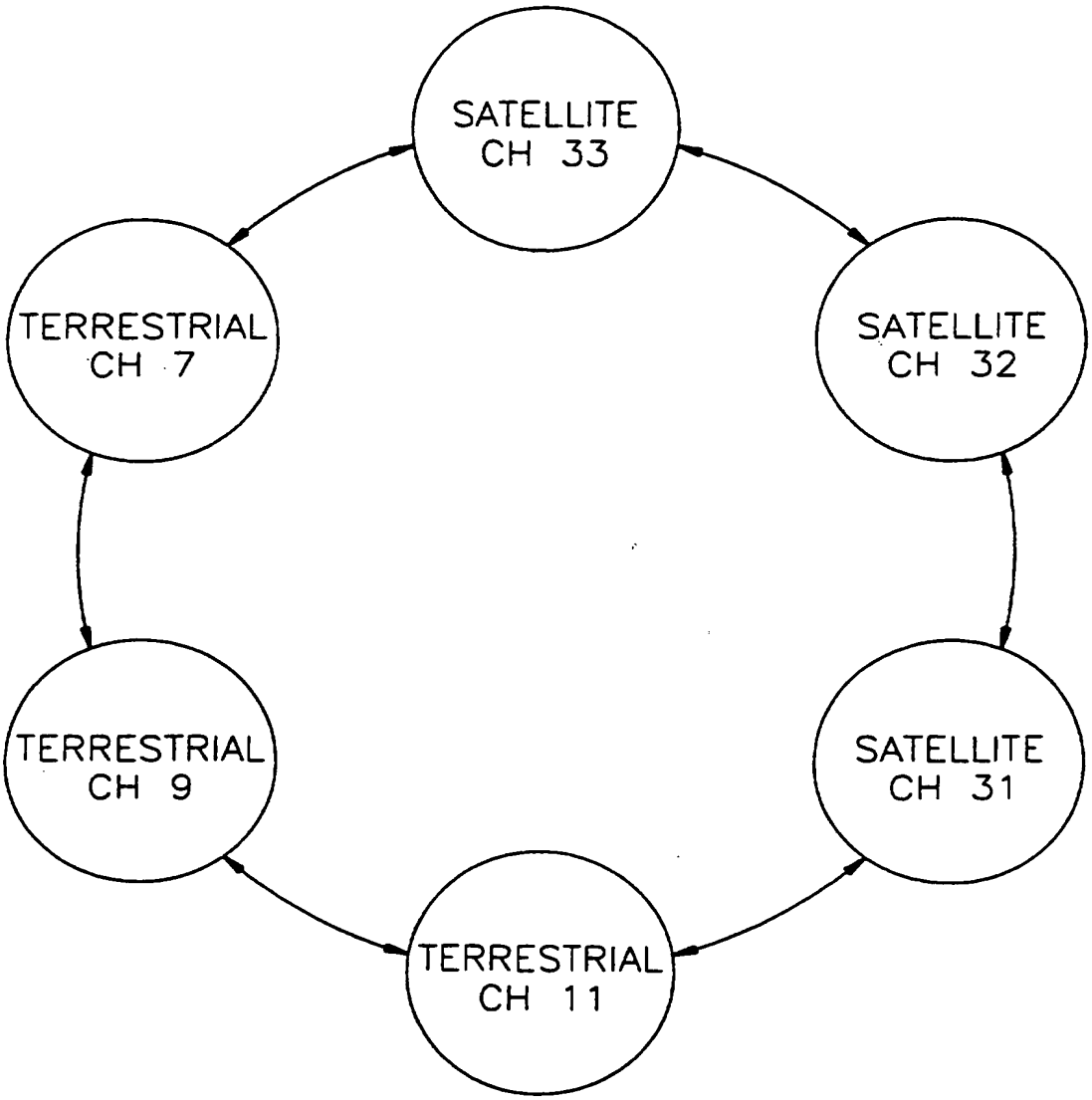
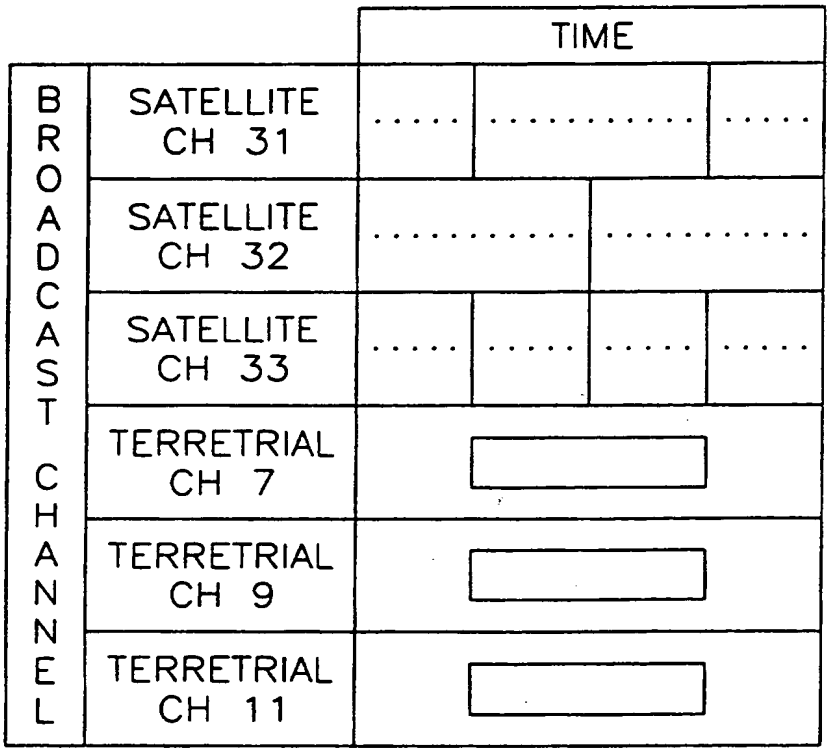


FIG. 4



METHOD FOR SELECTING A CHANNEL IN A COMPOSITE BROADCAST SIGNAL RECEIVER

The present invention relates to a composite broadcast signal receiver; and, more particularly, to a method for selecting a desired channel by using channel information contained in broadcast signals received by the receiver.

In recent years, a satellite broadcasting system using a communications satellite signal has been rapidly popularized worldwide, wherein the satellite broadcasting system is capable of transmitting a broadcast signal to a much wider area than the other broadcasting systems. As well known in the art, the satellite broadcasting system employs a superhigh frequency(SF) band having a frequency range, e.g., from 11.7 GHz to 12.2 GHz for carrying a digitized broadcast signal.

The digitized broadcast signal is received by a low noise blockdown converter(LNBC) incorporated in a parabolic antenna connected to a satellite broadcast signal receiver and is converted into a radio frequency(RF) signal in a frequency range of 950 - 2050 MHz. Thereafter, the satellite broadcast signal receiver is to be tuned to a channel selected by a user from the RF signal.

In general, in order to receive all of the broadcast signals, such as a terrestrial, a cable, and the satellite broadcast signal and so on, a separate receiver for each of

the broadcast signals is needed because the frequency bandwidths corresponding to the respective broadcast signals are different from each other.

In order to effectively receive and process all of the broadcast signals in a single receiver, a composite broadcast signal receiver, referred to as a set-top box (STB), has been developed. Conventionally, such a STB is comprised of two different signal processing paths, e.g., an analog and a digital signal processing paths for processing analog broadcast signals from the terrestrial and the cable broadcasting systems and a digital broadcast signal from the satellite broadcasting system.

In Fig. 1, there is shown a composite broadcast signal receiver for use in a STB, as described above, disclosed in a copending commonly owned application, U.S. Ser.No._____, entitled "METHOD AND APPARATUS FOR PROVIDING AN IMPROVED USER INTERFACE IN A SETTOP BOX".

As shown in Fig. 1, the composite broadcast signal receiver comprises a tuner 100, an analog broadcast signal demodulator 101, a digital broadcast signal demodulator 102, a first detector 103, a second detector 104, a RAM 106, a key matrix 107, a composite video signal processing circuit 108, a synchronization signal separator 201, a switch 117, a digital signal processing module 30, an A/D converter 230, and a microprocessor 105.

The digital signal processing module 30 includes an on-

screen display (OSD) buffer 111, an OSD generator 112, a video decoder 113, a mixing circuit 114, an NTSC/PAL encoder 116, switches 202, 203, a first and a second AND gates 204, 206, an inverter 205, and an OR gate 207, wherein the video decoder 113, the mixing circuit 114 and the switch 202 form a MPEG block 115. The first and second AND gates 204, 206, the inverter 205, and the OR gate 207 form a transparency indicator 40.

In order to tune the composite broadcast signal receiver to a channel of the terrestrial, the cable or the satellite broadcast signal, the user inputs the broadcasting mode and a channel by using the key matrix 107 to the microprocessor 105, and then, the microprocessor 105 generates a tuning control signal representing the broadcasting mode and the channel to be tuned to the tuner 100 and also provides an output control signal CS1 to the OR gate 207 for selecting a video signal on a terminal "0" or "1" of the switch 117.

Accordingly, in the composite broadcast signal receiver, when the user wants to change the current channel to a different channel, and the broadcasting modes of the two channels are different from each other, the user first selects the broadcasting mode of the different channel and then selects the different channel, a rather cumbersome procedure. Further, since there are a large number of channels assigned to the satellite, terrestrial and the cable broadcasts, it is not easy to remember information on the channels.

It is, therefore, a primary object of the present invention to provide a method for selecting a broadcast channel by using channel information contained in broadcast channel signals in a composite broadcast signal receiver.

In accordance with an aspect of the present invention, there is provided a method, for use in a composite broadcast signal receiver including a tuner for tuning a channel and a memory for storing a channel information, for selecting a desired channel by employing the channel information displayed on a screen contained in broadcast signals received by the receiver, the method comprising the steps of:

(a) detecting channel information on channels of the broadcast signals and storing the channel information in the memory;

(b) tuning to a previous set channel and detecting whether or not a certain channel is inputted to which the tuned channel is to be switched;

(c) if the inputting of the certain channel is detected, determining whether broadcasting modes of the inputted channel and the tuned channel are different from each other or not based on the stored channel information; and

(d) issuing a tuning control signal corresponding to the inputted channel to the tuner to thereby tune the composite broadcast signal receiver to the inputted channel.

The above and other object and features of the present invention will become apparent from the following description of preferred embodiments given in conjunction with the accompanying drawings, in which;

Fig. 1 shows a block diagram of a typical composite broadcast signal receiver;

Figs. 2A to 2C represent flow charts illustrating a control process performed by the composite receiver shown in Fig. 1, in accordance with a preferred embodiment of the invention;

Fig. 3 represents a state diagram of broadcast channel switching in accordance with a preferred embodiment of the invention;

Fig. 4 illustrates OSD data of channel information which can be displayed on a screen in accordance with a preferred embodiment of the present invention.

Referring now to Figs. 2A to 2C, there is illustrated a control process describing the inventive method for selecting a channel in a composite broadcast signal receiver in accordance with a preferred embodiment of the present invention, being demonstrated by using the composite broadcast signal receiver as shown in Fig. 1.

In general, as well known in the art, in Fig. 1, the key matrix 107 includes a power on/off key for turning the power of the receiver on and off, a channel setting key, a channel

up/down key and a numeric key for setting or selecting a broadcast channel mounted thereon. Further, in accordance with the preferred embodiment of the invention, the key matrix 107, as described hereinafter, includes an OSD key, for example, a channel informaton key for displaying channel information contained in each corresponding broadcast channel signal.

As shown in Fig. 2A, the control process begins at step 201, wherein the microprocessor 105 generates tuning control signals for tuning all of the assigned channels of the satellite, the terrestrial, and the cable broadcast signals and provides them to the tuner 100 at predetermined regular intervals, for example, thirty minutes or one hour, and consequently, all of the channel information data from the first and the second detectors 103, 104 are stored and renewed in the RAM 106 by the microprocessor 105 at stand-by state. The stand-by state is a state in which only the power of the microprocessor 105 is on and powers of all the other components are off. Moreover, as well known in the art, the channel information of each channel is included in each of corresponding channel signals.

Thereafter, in step 203, it is checked whether the power on key signal is received from the key matrix 107 or not. If the check result is negative, the process returns to step 201, and if the check result is positive, the process goes to step 205. In step 205, the composite broadcast signal receiver is

powered on under the control of the microprocessor 105 in response to the power on key signal from the key matrix 107.

Thereafter, in step 207, the microprocessor 105 tunes the composite broadcast signal receiver to a certain channel set before the power goes off, and then process goes to step 209.

In step 209, it is checked whether the channel up/down key signal for selecting another channel signal is inputted or not from the key matrix 107 by the user. If the check result is negative, the process goes to step 211, and if the check result is positive, the process goes to step 221.

In step 211, it is checked whether the channel information key signal for displaying the channel information on a screen is inputted or not. If the check result is negative, the process returns to step 209, and if the check result is positive, the process proceeds to step 213. Thereafter, in step 213, the microprocessor 105 reads out the channel information data from the RAM 106 and outputs same and cursor data to the OSD generator 112, wherein the cursor can point out a certain channel number in the displayed channel information on the screen. And in the meantime, the transparency indicator 40 issues a control signal CS3 to the switch 117, whereby the channel information data may be displayed on the screen, as shown in Fig. 4, and the cursor (not shown), as described above, can point to a displayed channel number in the channel information, wherein the cursor can be moved upward and downward by the channel up/down key

operation.

Thereafter, in step 215, it is checked whether the channel setting key signal is inputted or not. In detail, the user can select a required channel by using the channel setting key, or by using several numeric keys mounted on the key matrix 107 and the cursor will point to the required channel number of the channel information data. If the check result is positive, the process goes to step 221, and if the check result is negative, the process proceeds to step 217.

In step 217, it is checked whether an elapsed time has reached a predetermined time or not. If the check result is negative, i.e., the channel setting key signal is inputted during the predetermined time, the control process returns to step 215. If the check result is positive, i.e., the channel setting key signal is not inputted during the predetermined time, the control process goes to step 219. And then, in step 219, the microprocessor 105 stops to output the channel information data from the switch by issuing the output control signal CS1 to the switch. Thereafter, the control process returns to step 209.

On the other hand, in step 221, it is checked whether the inputted channel by the channel up/down key, the channel setting key or the numeric key and the tuned channel are in a same broadcasting mode or not, i.e., the microprocessor 105 compares the broadcasting mode of the inputted channel with that of the tuned channel to determine whether the

broadcasting modes are same or not by using the channel information data stored in the RAM 106. If the check result is negative, i.e., if the broadcasting mode of the inputted channel is different from that of the tuned channel, the control process proceeds first to step 223 and then to step 225 sequentially. On the other hand, if the check result is positive, the process goes to step 225 directly.

In step 223, the microprocessor 105 generates a broadcasting mode control signal, i.e., the output control signal CS1 for switching the output mode of the switch 117 to the OR gate 207, and then, the OR gate 207 generates the control signal CS3 to the switch 117. Thereafter, in step 225, the microprocessor 105 generates a tuning control signal for tuning the composite broadcast signal receiver to the inputted channel, whereby the inputted channel signal from the tuner 100 is outputted to the screen through the switch 117. Once the inputted channel tuning is completed, and then, the control process goes to step 227.

In step 227, it is checked whether the power off key signal is received or not. If the check result is negative, the control process returns to step 209, and repeats the control process from step 209 to step 227. However, in step 227, if the check result is positive, the control process proceeds to step 229.

Finally, in step 229, the composite broadcast signal receiver 250, as shown in Fig. 1, is powered off under the

control of the microprocessor 105 in response the power off key signal, and then the control process returns to the first step 201.

Consequently, as described above, in accordance with the preferred embodiment of the invention, the tune channel switching of the broadcast channels is performed by using the up/down key operation as shown in Fig. 3 which represents tune channel switching (or changing) state of the broadcast channels. In detail, as shown in Fig. 3, assuming the stored broadcast channels are satellite channels 31, 32, 33, and terrestrial channels 7, 9, 11, and the present tuned channel is satellite 33. If the channel down key signal is inputted subsequently, the tuned channel is switched to the satellite channels 32, 31, and the terrestrial channels 11, 9, 7 sequentially. On the contrary, if the channel up key signal is inputted subsequently, the tuned channel is switched to the terrestrial channels 7, 9, 11 and the satellite channels 31, 32 sequentially. And also, the user easily can select a required channel by using the channel information data, as shown in Fig.4, and the up/down key, the channel setting key or the numeric keys.

Accordingly, in accordance with the preferred embodiments of the invention, a channel tuning for receiving a required channel signal is easily performed and a required channel is selected appropriately by using the channel information and simple key operations.

While the present invention has been described with respect to certain embodiments only, other modifications and variation may be made without departing from the scope of the present invention as set forth in the following claims.

Claims:

1. A method, for use in a composite broadcast signal receiver including a tuner for tuning a broadcast channel and a memory for storing channel information, for selecting a desired channel by employing the channel information contained in broadcast signals received by the receiver, the method comprising the steps of:

(a) detecting channel information on channels of the broadcast signals and storing the channel information in the memory;

(b) tuning to a previous set channel and detecting whether or not a certain channel is inputted to which the tuned channel is to be switched;

(c) if the inputting of the certain channel is detected, determining whether broadcasting modes of the inputted channel and the tuned channel are different from each other or not based on the stored channel information; and

(d) issuing a tuning control signal corresponding to the inputted channel to the tuner to thereby tune the composite broadcast signal receiver to the inputted channel.

2. The method of claim 1, wherein at the step (a), detecting and storing the channel information are performed at a stand-by state of the receiver.

3. The method of claim 2, wherein at the step (a), the stored channel information data is updated at predetermined regular intervals.

4. The method of claim 1, wherein at the step (b), the tuning channel is set before the power of the receiver goes off.

5. The method of claim 4, wherein at step (b), tuning a previous set channel is performed after the power of the receiver is on.

6. The method of claim 5, wherein at the step (b), the tune channel switching is achieved by pressing a corresponding channel up/down key mounted on a key matrix.

7. The method of claim 5, wherein the step (b) includes the step of detecting whether a channel information key signal is inputted or not, and outputting the channel information stored in the memory, thereby displaying the channel information on a screen, if it is detected that the channel information key signal is inputted.

8. The method of claim 7, wherein at the step (b), the tune channel switching is performed by selecting a channel corresponding to the switched channel on channel information

displayed on the screen.

9. The method of claim 8, wherein at the step (b), the channel selecting is made by pressing a channel set key mounted on a key matrix.

10. The method of claim 9, wherein at the step (b), the tune channel selecting is made by pressing a corresponding numeric key mounted on a key matrix.

11. The method of claim 10, wherein the step (b) includes the step of detecting whether either one of the channel set key signal and the numeric key signal is inputted during a predetermined time or not, and if neither of the channel set key signal and the numeric key signal is detected during the predetermined time, stopping the output of the channel information.

12. The method of claim 11, further comprising, between the step (c) and (d), the step of generating a broadcasting mode switching signal for switching a broadcasting mode of the receiver in case that the inputted channel and tuned channel are different from each other.

13. A method, for use in a composite broadcast signal receiver including a tuner for tuning a broadcast channel and

a memory for storing channel information, for selecting a desired channel by employing the channel information contained in broadcast signals received by the receiver substantially as herein described, with reference to, or as illustrated in Figures 2A - 2C of the accompanying drawings.

The Patent Office

Application No: GB 9811170.1
Claims searched: 1-13

Examiner: K. Sylvan
Date of search: 6 August 1998

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.P): H3Q (QCD)

Int Cl (Ed.6): H04N (5/46,5/50,7/20)

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
A	EP0601553 A1	Grundig. See column 4 lines 32-39 and column 4 line 49 to column 5 line 24.	-
A	EP0453937 A2	Samsung. See steps 113-119 in figure 1.	-
A	US5512955	Sony. See figure 1 and abstract.	-
A	US5257106	Sony. See column 4 lines 18-23.	-

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X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.